CLAIMS

1.- An organic electroluminescent device having an anode (2), a cathode (3), and an intermediate element (7), which is set between the anode (2) and the cathode (3) and comprises at least one hole-transporting organic material, and at least one electron-transporting organic material; the electron-transporting organic material and the hole-transporting organic material being designed to form between them exciplexes or electroplexes; the device (1) being characterized in that said intermediate element (7) comprises at least one luminophore material; the luminophore material being designed to emit electromagnetic radiation; the luminophore material being supplied, in use, for transfer of energy from said exciplexes or electroplexes.

2.- The device according to Claim 1, wherein said intermediate element (7) essentially includes a first layer (4), which comprises the hole-transporting organic material and is set in contact with the anode (2), and a second layer (6), which comprises the electron-transporting organic material and is set in contact with said cathode (3) and said first layer (4).

3.- The device according to Claim 2, wherein said first layer (4) comprises the luminophore material.

4.- The device according to any one of the preceding claims, wherein said anode (2) is substantially transparent.

5.- The device according to any one of Claims 2 to 4, wherein said first layer (4) comprises polycarbonate (PC).

6.- The device according to any one of Claims 2 to 5, wherein said electron-transporting organic material has a first ionization potential and said hole-transporting organic material has a second ionization potential; the first ionization

potential being higher by at least 0.7 eV than the second ionization potential.

7.- The device according to any one of the preceding claims, wherein said electron-transporting organic material has a first electronic affinity and said hole-transporting organic material has a second electronic affinity; the first electronic affinity being higher by at least 0.4 eV than the second electronic affinity.

8.- The device according to any one of the preceding claims, wherein said luminophore material comprises at least one metallocyclic compound, which satisfies the structural formula M L L' L'', in which M represents a transition metal, L, L' and L'' represent, each independently of the others, a chelating ligand, which satisfies the structural formula:

in which Y represents an electron-donor heteroatom.

9.- The device according to Claim 8, wherein M represents iridium (Ir).

10.- The device according to either Claim 8 or Claim 9, wherein M is positively formally charged.

11.- The device according to any one of Claims 1 to 7, wherein said luminophore material comprises at least one metallocyclic compound, which satisfies the structural formula M' L L', in which M' represents a transition metal, L and L' represent, each independently of the other, a chelating ligand, which satisfies the structural formula:

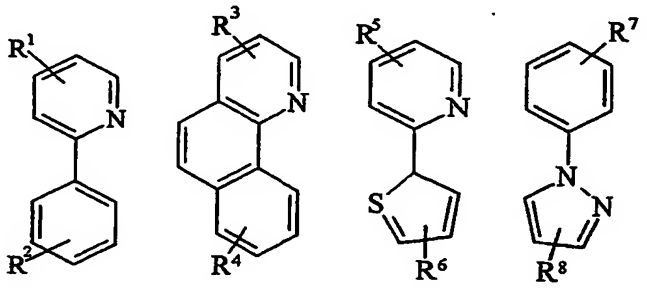
in which Y represents an electron-donor heteroatom; M' representing a transition

metal chosen in the group consisting of:

- platinum (Pt); and
- palladium (Pd).

12.- The device according to Claim 11, wherein M' is positively formally charged.

13.- The device according to any one of Claims 8 to 12, wherein the chelating ligands L, L' and L'' satisfy, each independently of the others, a structural formula chosen in the group consisting of:



in which R^1, R^2, R^3, R^4, R^5, R^6, R^7, and R^8 represent, each independently of the others, one chosen from among:

- an alkyl group,
- an aryl group,
- a condensate ring, or
- a hydrogen atom;

L, L' and L'' being negatively formally charged.

14.- The device according to any one of Claims 8, 9, 10 and 13, wherein said metallocyclic compound is iridium tris (2-phenylpyridine) ($Ir(ppy)_3$).

15.- The device according to any one of Claims 11 to 13, wherein said metallocyclic compound is chosen in the group consisting of:

- platinum bis (2-thienylpyridine); and

- platinum bis (2-phenylpyridine).

16.- The device according to any one of the preceding claims, wherein said luminophore material comprises at least one organometallic complex which satisfies the structural formula:

$M'' Q_n A_{3-n}$,

in which n is comprised between 1 and 3, each Q is, independently of the other Qs, a quinoline derivative, and each A is, independently of the other As, a phenol derivative, and in which M'' is a metal, having a positive formal charge, chosen in the group consisting of:

- aluminium (Al), and
- gallium (Ga).

17.- The device according to Claim 16, wherein the organometallic complex is alumino bis (phenol)(8-hydroxyquinaldine) ($Alqfen_2$).

18.- The device according to any one of the preceding claims, wherein said luminophore material comprises at least one organometallic complex, which satisfies the structural formula:

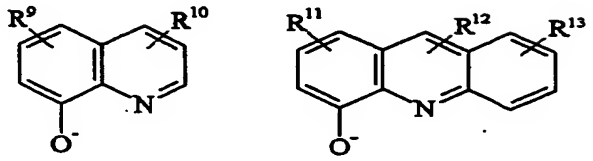
$M''' Q_m A_{2-m}$,

in which m is 1 or 2, each Q is, independently of the other Qs, a quinoline derivative, and each A is, independently of the other As, a phenol derivative, and in which M''' is a metal, having a positive formal charge, chosen in the group consisting of:

- zinc (Zn), and
- beryllium (Be).

19.- The device according to Claim 16 or Claim 18, wherein each Q represents, independently of the other Qs, a quinoline derivative, which satisfies a

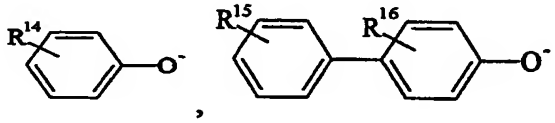
structural formula chosen in the group consisting of:



in which R^9, R^{10}, R^{11}, R^{12} and R^{13} represent, each independently of the others, one chosen from among:

- an alkyl group,
- a hydrogen atom, or
- an aryl group.

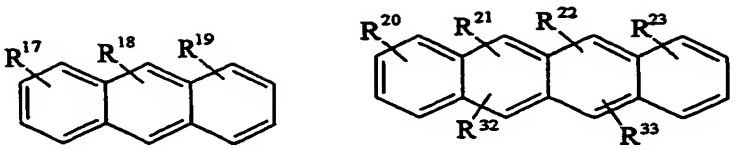
20.- The device according to any one of Claims 16 to 19, wherein each A is a phenol derivative, which satisfies, independently of the other As, a structural formula chosen in the group consisting of:



in which R^{14}, R^{15} and R^{16} represent, each independently of the others, one chosen from among:

- an alkyl group,
- a hydrogen atom, or
- an aryl group.

21.- The device according to any one of the preceding claims, wherein said luminophore material comprises at least one aromatic hydrocarbon with condensate rings, which satisfies a structural formula chosen in the group consisting of:

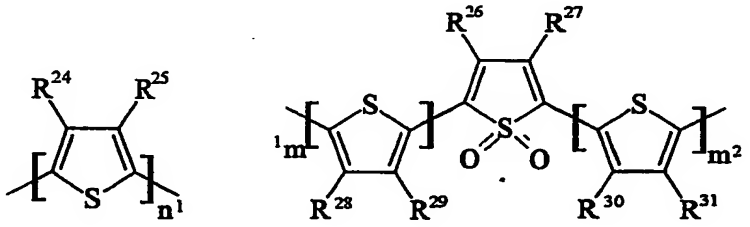


in which R^{17}, R^{18}, R^{19}, R^{20}, R^{21}, R^{22}, R^{23}, R^{32} and R^{33} represent, each independently of the others, one chosen from among:

- an alkyl group,
- a hydrogen atom, or
- an aryl group.

22.- The device according to Claim 21, wherein said aromatic hydrocarbon with condensate rings is rubrene.

23.- The device according to any one of the preceding claims, wherein said luminophore material comprises at least one thiophene derivative which satisfies a structural formula chosen in the group consisting of:



in which n^1 is an integer comprised between 3 and 7, m^1 and m^2 are, each independently of the other, integers comprised between 1 and 3, in which R^{24}, R^{25}, R^{26}, R^{27}, R^{28}, R^{29}, R^{30} and R^{31} represent, each independently of the others, one chosen from among:

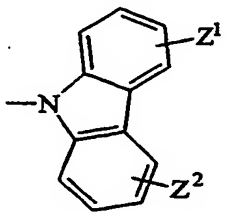
- an alkyl group,
- a hydrogen atom, or
- an aryl group.

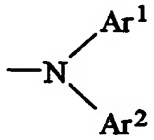
24.- The device according to any one of the preceding claims, wherein said

hole-transporting organic material is substantially represented by a tertiary aromatic amine; the tertiary aromatic amine satisfying the structural formula:

in which T^1 and T^2 represent, each independently of the other, a tertiary amine; and in which A represents an aryl group.

25.- The device according to Claim 24, wherein T^1 and T^2 represent, each independently of the other, a tertiary amine which satisfies a structural formula chosen in the group consisting of:





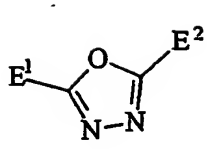
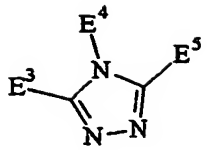
in which Z^1 and Z^2, represent, each independently of the other, one chosen from among:

- an alkyl group,
- an alcohol group, or
- a hydrogen atom;

in which Ar^1 and Ar^2 represent, each independently of the other, an aryl group.

26.- The device according to Claim 24 or Claim 25, wherein said hole-transporting organic material comprises 4,4',4''-tris (*N*-3-methylphenyl-*N*-phenylamino)-triphenylamine (m-MTDATA).

27.- The device according to any one of the preceding claims, wherein said electron-transporting organic material is substantially constituted by a heterocyclic compound which satisfies a structural formula chosen in the group consisting of:

in which E^1, E^2, E^3, E^4 and E^5 represent, each independently of the others, an aryl group.

28.- The device according to any one of the preceding claims, wherein said electron-transporting organic material comprises 2-(4-biphenyl)-5-phenyl-1,3,4-oxadiazole (PBD).

29.- A method for producing an organic electroluminescent device; the method comprising a depositing step for depositing an intermediate element (7) on an anode (2); and an apposition step for positioning a cathode (3) on said intermediate element (7); the intermediate element (7) comprising at least one luminophore material; the luminophore material being designed to emit electromagnetic radiation; the method being characterized in that said intermediate element (7) comprises at least one hole-transporting organic material and at least one electron-transporting organic material; the electron-transporting organic material and the hole-transporting organic material being designed to form between them exciplexes or electroplexes; the luminophore material being supplied, in use, for transfer of energy from said exciplexes or electroplexes.

30.- The method according to Claim 29, wherein said luminophore material is chosen so that said electromagnetic radiation is of a given wavelength.

31.- The method according to Claim 29 or 30, wherein said depositing step comprises a first depositing substep for depositing said first layer (4) on an anode

(2); and a second depositing substep for depositing the second layer (6) on the first layer (4); of positioning a cathode (3) on said second layer (6).

32.- The method according to Claim 31, wherein, during said first depositing substep, said luminophore material is deposited.

33.- The method according to Claim 31 or 32, wherein, during said first depositing substep polycarbonate, is deposited.